

# FOREST CONTROL

A  
13.25  
In 81  
114

## by CONTINUOUS INVENTORY

"Today I have grown taller from walking  
with the trees."

...Karle Wilson

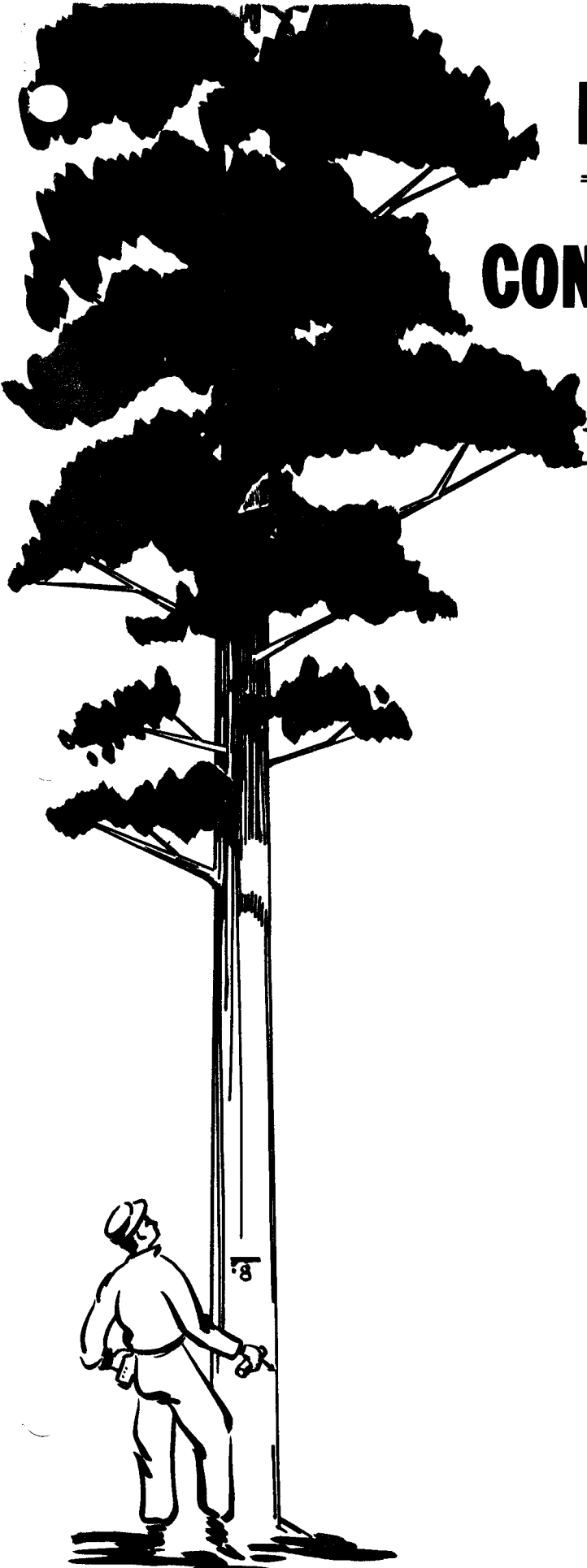
Milwaukee, Wis. September, 1963 No. 114

### EVER CHANGING; EVER CHANGELESS

"At first glance the forest seemed unchanging and timeless yet it was anything but that. If you watched it, you saw that it was changing by the hour and by the day; soon you realized that it must have been changing by the year and by the decade; and finally you knew quite well that it had always been changing, always been in flux, and probably always would be."

Excerpt from an Article by  
Christopher Rand in The  
New Yorker of August 10, 1963

FORESTRY SCHOOL LIBRARY  
COPY NO. \_\_\_\_\_



September 17, 1963

LET THE FOREST DECIDE; NOT THE MATHEMATICIAN

CFI has an ecological background. It measures closely associated forest trees within a finite or bounded figure. An inventory system of this type rests upon the soundest of natural foundations. It takes into account the all-inclusive ecosystem and within it determines the true rate of change and growth of trees and forests.

There are more than 20,000 ecosystem samples in Region 9. This season we are busy as usual working with industrial companies in 7 projects involving 4,000 to 5,000 circular sample plots on 1 million acres of forest land. Twenty-five foresters are taping trees and 25 taking tally on Port-A-Punch cards. These companies, their foresters and I believe and agree that in inventory work the natural sample is the best sample, and I'll tell you why.

Ecosystem samples measure the living environment. The trees within these samples have long been associated. Who are we to try to dissociate them in this brief three-minute census of each tree? It is important to critically judge and carefully measure forest trees as captive neighbors and not as dispersed and separated individuals. CFI is not merely an exercise in the science of mensuration. It is a scientific study of trees and forest relationships.

Trees, the dominating influence in forest environments, are inter-dependent. Not only do they lean against and depend upon each other but they also influence each other in many ways. It is quite essential to quantitatively consider the environmental inter-action of trees in the management of the forest, and this is exactly how CFI handles the inventory of the forest.

To secure a true measure of the relationships, inter-actions and influences of trees, we propose in Region 9 to continue to recommend permanent, fixed radius inventory samples to all cooperators. It seems certain that when forest inventory is improved to the point where it measures every possible correlation between the tree and its habitat, so also will forest management and silviculture be improved. The best forest practice is dependent upon a sound knowledge of natural forest conditions, and CFI follows natural lines. Nature is the best teacher and we cannot safely go against her wishes and limitations.

The Region 9 industrial CFI system has been successful since its presentation to the American Pulpwood Association in New York City in 1952. Since then it has not been necessary to change our fundamental system. All of our samples are recovered at re-inventory. Not one of our post stratified Lake States inventories has regressed into a costly one-shot cruise. CFI in Region 9 continues to provide a safe, sound and true measure of the growth of associated trees within the framework of the silvical structure of the forests of the North Central Region.

CAL STOTT  
Forester  
U. S. Forest Service  
Region 9

# “CFI” Woodlots— Opportunities for Integrating Research, Education, And Action Programs

OLIVER D. DILLER

*Chairman, Department of Forestry,  
Ohio Agricultural Experiment Station,  
Wooster, Ohio, U.S.A.*

The continuous forest inventory or “CFI” system of forest management is a method which is increasingly used by foresters throughout the world. The *methode du controle*, as it is known in Europe, was originally proposed by the French forester Gurnaud in 1878. The Swiss forester Biolley later applied the method on a large scale in the community forests of the Val de Travers in Neuchatel Canton of Switzerland.

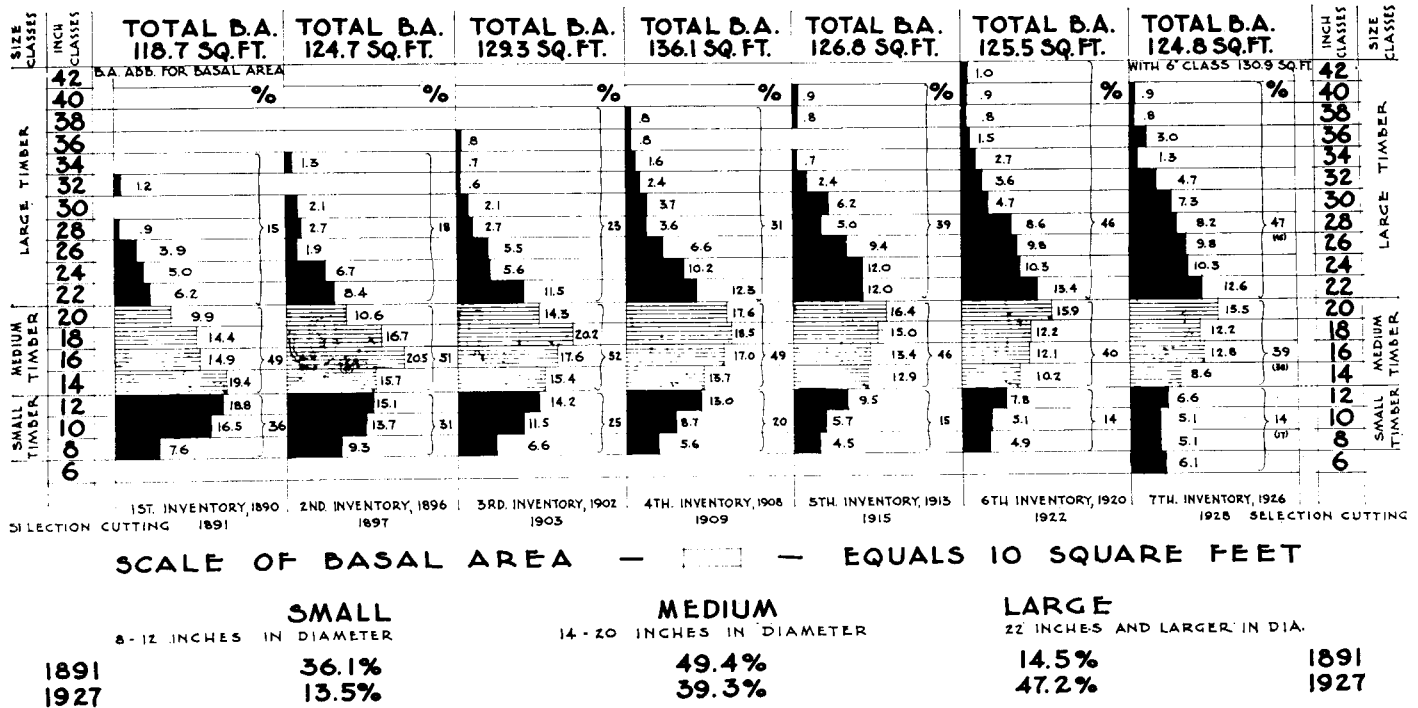
The Couvet Community Forest is one example of a forest which has been managed according to this system since 1891. This method offers special possibilities for many forest areas which may be intensively managed, such as farm woodlands. In essence, it consists of making recurrent measurements of permanently established plots

on which each tree is individually numbered (In Europe, it is customary to make a 100 percent cruise). Permanent plot and tree records give a complete history of individual trees, and whole forests and periodic remeasurements mirror changes in the forest which furnish fundamental guides to silvicultural practice. Through the proper use of the records obtained from repeated measurements of individual trees representing a reliable sample, the manager becomes a certified forest accountant who compiles a woods account ledger, setting forth capital gains and losses in the forest.

Since 1946, C. B. Stott of the U.S. Forest Service has been a leading exponent of the continuous forest inventory system as applied to natural selection silviculture. In a

Figure 1.

# GROWING STOCK AT BEGINNING OF EACH CYCLE OF DIVISION 14 (FORMERLY 1-1B) OF THE COMMUNAL FOREST OF COUVET, BY TREE SELECTION UNDER CONTROL (CYCLE-6 YRS.) EXPRESSED IN SQUARE FEET OF BASAL AREA PER ACRE



brief note titled, "Natural Selection in a Sound Foundation for Silvicultural Practice," Stott wrote the following: "The year by year behavior of trees that make up the forest is the best guide to its silvicultural management. For those who are there to see, the trees in any woods constantly pass in review."

### Application of the CFI System

A chart (Figure 1), with a series of bargraphs showing the growing stock at the beginning of each 6-year cycle in the Couvet Forest in Switzerland, has been reproduced because it demonstrates the application of the continuous inventory system. It illustrates how a young stand "grew up" during the period 1891-1927. In 1891, most of the volume was in the 14-inch diameter class, with only 12 diameter classes represented. In 1927, most of the volume was in the 20-inch class with 18 diameter classes represented. This was accomplished through a series of light harvests made at six-year intervals following a detailed inventory. The goal was to increase the proportion of the volume in standing timber to the large sizes. In 1891, 36 percent of the basal area was in small timber and 14.5 percent in large timber. In 1927, the situation was reversed, having 13.5 percent of the volume in small timber and 47 percent in the larger sizes.

### CFI Woodlands in the State of Ohio, U.S.A.

In 1946, the Department of Forestry at the Ohio Agricultural Experiment Station initiated a program to estab-

lish a series of small woodlands, all of which were to be under CFI management. To date, 27 such areas, ranging from 15 to 80 acres in size, have been developed. In all of these woodlands a similar set of bargraphs is being prepared, showing the distribution of volume as well as the cut by specified intervals.

In order to arrive at the goal of continuously producing the maximum of high-quality timber from the species best suited to the site, it is necessary to apply certain ecological principles. Some of these are: (a) protection from destructive agents, such as livestock grazing and fire; and (b) conservative cutting, removing trees which are declining in vigor, indicating that they are no longer in harmony with their environment. When the detailed inventory is taken at short intervals, let us say every five years, the silviculturist has a sound basis for marking the right trees to be removed so that as he works with the processes of natural selection he builds up the productivity of the forest to its maximum capacity.

One of the interesting woodlands under the supervision of the Ohio Agricultural Experiment Station is the Whitford woods in northeastern Ohio. This 47-acre tract serves, as do the others, as a local living example of the CFI system in action. It also is used effectively as an educational tool by the Extension and Service Foresters in this part of the State.

In this woodland, 47 one-fifth-acre growth-study plots were established in 1946 at regularly spaced intervals. This amounted to a 20 percent continuous sampling of

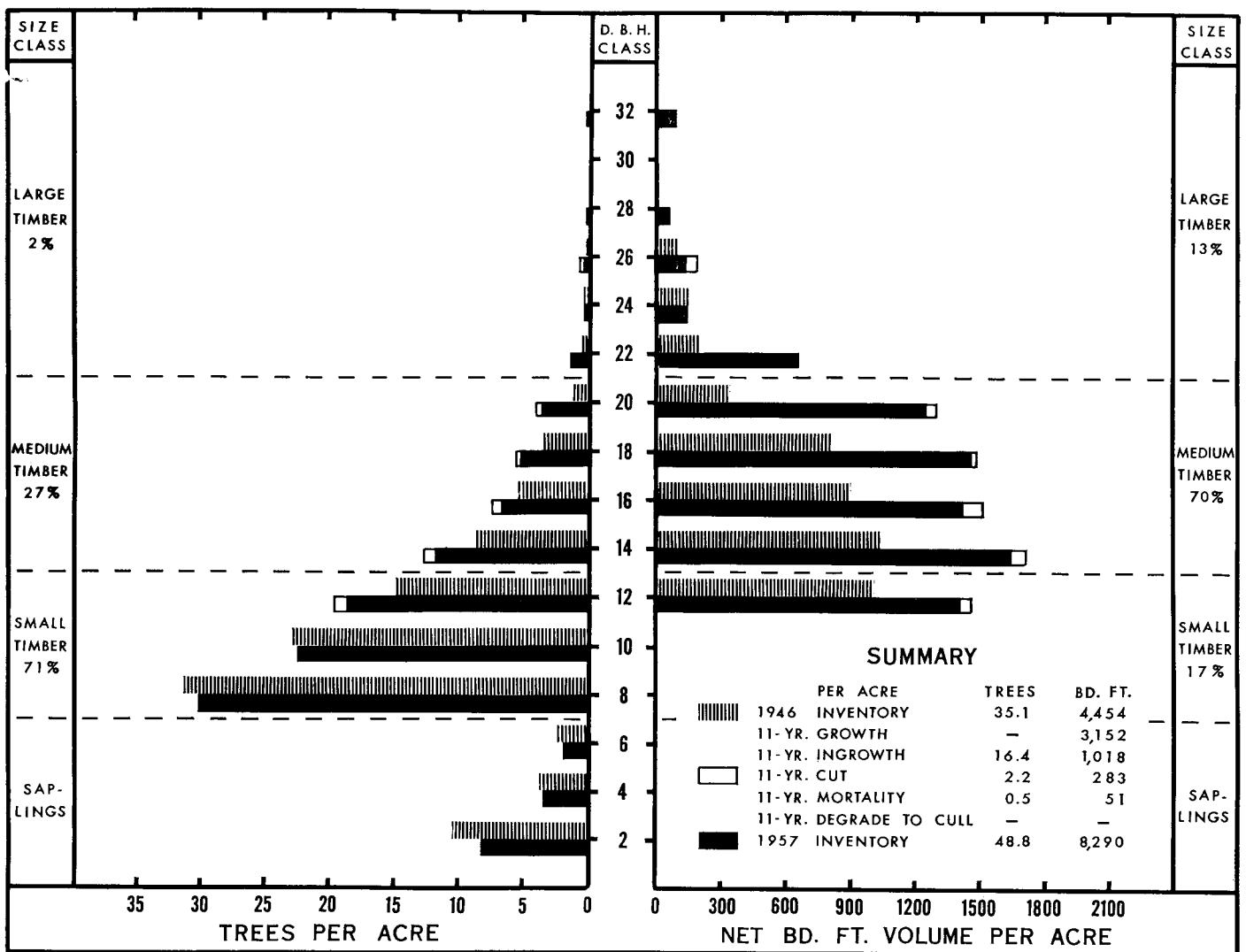


Figure 2.

## GROWING-STOCK IN WHITFORD WOODS

MIDDLEFIELD TOWNSHIP, GEAUGA COUNTY, OHIO

1946 - 1957

the woods. Detailed measurements of the numbered trees on these plots were taken in October 1946, in April 1952, and again in November 1957.

Figure 2 shows the growing stock in the Whitford woods following the 1946 and 1957 inventories, along with growth, harvest, and mortality data\*. During this period, crop trees almost doubled in volume. Sawtimber stocking per acre advanced from 4,454 to 8,290 board feet net. Diameter distribution by size classes is advancing toward a balanced, fully stocked, uneven-aged beech-maple stand. Net growth during the 11 growing seasons amounted to 287 board feet per acre per year, but the 1957 selectively marked improvement cut was only 177 board feet per acre, because the silviculturist has a goal of

\*Aughanbaugh, John. Experimental woodlands as a means of encouraging improved management of small tracts. *Journal of Forestry*, Vol. 57, No. 6, June 1959.

around 12,000 board feet as the optimum stocking for this site. In order to reach this goal, changes in the structure of the forest will be carefully studied, following successive inventories and growth data based on past periods of management.

CFI farm woodlands provide much background information, not only on the trends in species composition, quality, and growth rate for the woodland as a whole, but they also show differences in growth and value of individual tree species. Just as progressive dairy farmers keep individual records on their cows, so good woodland owners need to know the performance of the individual trees which compose the stand.

Continuous records on many individual tracts under CFI management are being used effectively in persuading woodland owners to adopt sound practices. Even though this project has been under way in Ohio for only 13 years,

it is apparent that these so-called model woodlands provide an opportunity for integrating forest research, education, and action programs in woodland management on both a State and local level.

Foresters in the United States have not enjoyed the benefits of centuries of accumulated information obtained from woodlands under sustained-yield management as have their brothers in certain other parts of the world, but as more areas come under continuous and systematic management they will, in time, develop forest practices which are best suited to the sites involved.

#### RESUMES

*“La méthode du contrôle”—comment elle permet l’intégration de la recherche, de l’enseignement et des programmes d’action.*

Le système d’aménagement forestier reposant sur un inventaire forestier continu (CFI), ou “méthode du contrôle”, est une méthode utilisée de plus en plus par les sylviculteurs du monde entier. Elle consiste essentiellement à procéder, à des intervalles réguliers, à des mensurations dans des parcelles établies de façon permanente et dans lesquelles chaque arbre porte un numéro. De par leur nature permanente, les statistiques ainsi établies fournissent l’historique complète de chaque arbre et de l’ensemble de la forêt, et les mensurations opérées périodiquement traduisent les changements qui s’effectuent dans la forêt et qui servent de guide fondamental pour la pratique de la sylviculture.

En 1946, la Division de Sylviculture du Centre d’Expérimentation Agricole de l’Ohio a mis en oeuvre un programme visant à établir une série de petites parcelles boisées, faisant toutes l’objet d’un aménagement conformément au système de la “méthode du contrôle”. La plupart de ces parcelles sont exploitées conformément à un cycle de cinq années et sont effectivement utilisées pour les recherches sylviculturales locales, ainsi que pour la formation pratique des membres de Service Forestier de l’Etat de l’Ohio.

*Bosques de Inventario Forestal Continuo: Oportunidades para Programas de Investigación Integral, Educación y Acción.*

El método de inventario forestal continuo (CFI) es usado cada vez más por los silvicultores del mundo entero. En esencia, éste consiste en llevar cuenta exacta de parcelas en las cuales cada árbol está numerado. Los datos recogidos sobre la parcela y los árboles en ella, proporcionan la descripción completa de cada árbol y de todo el bosque. Las inspecciones periódicas indican los cambios forestales y de esta manera se obtienen datos útiles que sirven de guía en materia de prácticas silvícolas.

En 1946, el Departamento de Silvicultura de la Estación Experimental Agrícola de Ohio inició un plan para crear una serie de pequeños bosques que, desde ese año, han sido administrados conforme al método de inventario forestal continuo. La mayoría de ellos siguen un ciclo quinquenal de corta. Los bosques antes mencionados están utilizándose con magníficos resultados para la investigación de la silvicultura local y como medios de instrucción por los ingenieros de montes del estado de Ohio.